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TRANSMITTAL OF APPEAL BRIEF (Large Entity)	Docket No. BA-00577

In Re Application Of: **Thomas J. McIntyre**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/608,169	June 26, 2003	L. Boutsikaris	22500	2872	8244

Invention: **Feedback Controlled Photonic Frequency Selection Circuit**

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on

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Mark A. Wurm

Signature

Dated: **November 28, 2005**

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November 28, 2005

(Date)

Mark A. Wurm

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cc:

Attorney Docket No.: BA-00577 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	10/608,169	Confirmation No.:	8244
Applicant	: Thomas J. McIntyre		
Filed	: June 26, 2003		
TC/A.U.	: 2872		
Examiner	: L. Boutsikaris		
Title	: FEEDBACK CONTROLLED PHOTONIC FREQUENCY SELECTION CIRUCIT		

Docket No. : BA-00577
Customer No. : 22500

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By: Mark A. Wurm

Mark A. Wurm

APPEAL BRIEF UNDER 37 CFR 41.37(a)

Appellants have filed a timely Notice of Appeal from the Final Office Action dated May 27, 2005. A single copy of this Brief is provided pursuant to 37 CFR 41.37(a). An authorization to charge the appropriate fee is included herewith.

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I. Real Party in Interest:

BAE SYSTEMS Information and Electronic Systems Integration, Inc. is the real party in interest in the above-identified patent application.

II. Related Appeals and Interferences:

The appellant is aware of no other appeals or interferences that will directly affect or have a bearing on this appeal.

III. Status of the Claims:

Claims 1 – 23 are currently pending.

Claims 1 – 23 are currently rejected.

Claims 1- 13 are the subject of this appeal and are appended hereto in the "Claims Appendix" attached hereto.

Claims 14 – 23 are not subject to this appeal.

IV. Status of Amendments:

An Amendment and Response to the Final Office Action has been has been filed, but not entered by the Examiner as stated in his Advisory Action dated August 11, 2005. As this Amendment After Final has not been entered it is not reflected in the appended claims.

V. Summary of the Claimed Subject Matter:

Independent Claim 1

The invention, as recited by claim 1 is a photonic circuit having a feedback loop that permits the infinitely variable fine tuning of frequencies that can be added or dropped by the circuit. See, paragraph [0004] of the application and Figure 1. The photonic

circuit has a resonator of a certain size, shape and refractive indices for a particular temperature. A sensor in proximity to the resonator monitors the temperature of the resonator. See Figure 1 and paragraph [0010] of application. A processor alters the current supplied to a heater element positioned near the resonator to maintain the temperature of the resonator and thereby the specific frequency that is selected for resonation. See paragraphs [0005] and [0010] as well as Figure 1 of the application.

Dependent claim 2 recites embodying the resonator, heater and temperature sensor in an integrated circuit chip. See paragraph [0011] of the application

Dependent claim 3 recites processor control to selectively add or drop frequencies. See paragraph [0015] of the application.

Dependent claim 4 recites accurate control of photonic switching. See paragraph [0016] of the application.

Dependent claim 5 recites use of an aluminum wire for temperature sensing. See paragraph [0015] of the application.

Dependent claim 6 recites use a processor for feedback of the temperature sensing and heater. See paragraphs [0005] and [0016] of the application.

Independent claim 7

The invention claims the process of tuning of the frequency selected by identifying the frequency to be selected, sensing the temperature, transmitting sensed temperature to a processor, determining whether the temperature corresponds to the selected frequency and adjusting the temperature as necessary. See paragraph [0010] of the application.

Dependent claim 8 recites use of resistance change is a metal wire to sense temperature change. See paragraph [0015] of the application.

Dependent claim 9 recites the use of aluminum wire to sense temperature change of the resonator. See paragraph [0015] of the application.

Dependent claim 10 recites the process to variably tune a frequency selected by a photonic resonator by measuring the resistance of a wire at room temperature, then forcing a current through the wire and determining the temperature by measuring the resistance of this wire. See paragraphs [0015] and [0016] of the application.

Dependent claim 11 recites the process to variably tune a frequency selected by a photonic resonator including the steps of transmitting a current though a wire, connecting a volt meter to the wire, measuring the voltage and calculating the resistance of the wire. See paragraph [0016] of the application.

Dependent claim 12 recites the use of a Kelvin connection on the temperature sensor wires. See paragraph [0010] of the application.

Dependent claim 13 recites the use of a lookup table to select frequency based on measured temperature. See paragraph [0016] of the application.

VI. Grounds of Rejections to be Reviewed on Appeal:

1. Claims 1 – 3, 6 – 8, 10 – 11 and 13 are finally rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,159,601 to Huber.

2. Claims 1, 3 – 4, 6 – 7 are finally rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,498,878 to Ueda.

3. Claims 1, 3, 6 – 8, 10 – 11 are finally rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,438,277 to Eggleton.

4. Claims 5 and 9 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Huber (USP 5,159,601) in view of U.S. Patent No. 5,696,543 to Koizumi.

5. Claim 12 is finally rejected under 35 U.S.C. 103(a) as being unpatentable over Huber (USP 5,159,601) in view of U.S. Patent No. 6,720,782 to Schwindt.

VII. Argument:

1. §102 Rejection of the Claims

Claims 1-3, 6-8, 10-11 and 13 were rejected under 35 U.S.C. § 102(b) for anticipation by Huber (U.S. 5,159,601). The Applicant respectfully traverses this rejection.

It is well established that to anticipate a claim, the reference must teach every element of the claim. In particular, 35 U.S.C. 102(b) and (e) require that the allegedly anticipating reference describe the invention. Therefore, a "claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegall Bros. v. Unions Oil Co. of California,* 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Not only must the allegedly anticipating reference describe the invention, but "[t]he identical inventions must be shown **in as complete detail** as is contained in the ...claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Furthermore, the claims must be read as they would be interpreted by those of ordinary skill in the art. *In re Sneed,* 710 F.2d 1544, 218 USPQ 385 (Fed. Cir. 1983). Thus, a 35 U.S.C. 102 (b) or (e) reference may be applied to the invention as recited in the claims by showing in the reference the exact description of all claim

elements, or equivalent elements, cooperating as claimed. For patentability, the claims must reflect differences with literal elements described in the allegedly anticipating reference and with equivalent elements. For equivalence, elements must perform the "the identical function specified in the claims(s) in substantially the same way," and produce "substantially the same results as the corresponding element disclosed in the specification." *Kemco Sales, Inc. v. Control Papers Co.,* 208 F.3d 1352, 54 USPQ2d 1308 (Fed. Cir. 2000).

The present application, in an embodiment, discloses and claims a photonic frequency selection circuit. The circuit has a substrate 25, a resonator 20, heating element 35, temperature sensor 30, processor 40, and current source 45. (¶ 10) The tuning of the temperature of the resonator 20 via the temperature sensor 30 and the heating element 35 changes the refractive index of the resonator 20, which thereby changes the frequency selected by the circuit. (See application ¶ 15) A precise listing of temperatures and frequencies are loaded into a logic device, and by selecting a temperature/frequency combination from the logic device, the frequency selected by the photonic circuit can be precisely selected. (See application ¶16)

Huber discloses a tunable laser. The laser comprises in part a pump 10, a dichroic mirror 14, an optical fiber 16, and a mirror provided by a grating 18. The grating 18 is connected to a substrate 22 which has a heating element 24 and a thermistor 26. The period of the grating 18 determines the wavelength of light reflected within the laser. By physically stretching or contracting the substrate 22 to which the grating is attached, the period of the grating 18 is changed, thereby changing the wavelength of the light reflected within the laser. (See col. 2, lines 43-64).

The Office Action states that Huber discloses a resonator in the form of a grating 18. The Applicant respectfully traverses this contention. The **grating** 18 in Huber is a **mirror** that depends on **physical alteration of the period** of the grating to determine the wavelength of light that is reflected by the laser. (*Emphasis added.*) By contrast, the resonator recited in claim 1 of the present application has its refractive index altered by changes in temperature (or its refractive index is maintained constant by maintaining its temperature), thereby changing the frequency selected by the circuit. Since claim 1

recites a resonator, and Huber does not disclose a resonator, claim 1 is not anticipated by Huber, and the Applicant earnestly solicits the allowance of claim 1. The Applicant also solicits the allowance of claims 2-6, which depend on claim 1. The Applicant further solicits the allowance of independent claim 7, which recites a resonator, and claims 8-13 which depend on claim 7 and also include the recitation of a resonator.

Furthermore, claims 1 and 7 recite that a temperature/frequency pair is retrieved from a logic device, and the temperature of the resonator is adjusted to that temperature in order to precisely control the frequency selected by the photonic circuit. Huber refers to a laser, not a photonic switch, and hence does not disclose the precise control of the present invention, but is only concerned with maintaining the wavelength within a laser's gain bandwidth. See Huber col. 1, lines 40-45. Moreover, Huber does not disclose either a processor or a memory such as disclosed and claimed by the present invention for the precise control of selected frequencies.

In rejecting claim 13, the Office Action states that it is inherent in the operation of the circuit disclosed by Huber that a wavelength for the resonator corresponds to a respective temperature, with a list of temperatures and wavelengths constituting a lookup table. The Applicant respectfully traverses this contention. Huber does not even disclose a processor or a memory. A table of temperatures and wavelengths therefore cannot be inherent. The Applicant respectfully submits that the Office Action is improperly using the Applicant's disclosure against the Applicant, and requests that this rejection be withdrawn.

Lastly, the Office Action states that "in order for the system [of Huber] to associate a measured temperature with a desired temperature (which would cause the laser to emit the desired wavelength), it is inherent that some kind of logic is used (e.g., in the simplest form whether a measured temperature is equal or not equal to a set temperature)." Under the doctrine of inherency, the prior art must necessarily function in accordance with, or include, the claimed limitations. *Telemac v. Topp Telecom,* 247 F.3d 1316, 1327-28 (Fed. Cir. 2001). However, the Office Action tacitly admits that Huber does not necessarily include all the limitations of claim 1. Claim 1 recites "logic associating one or more ***frequencies of light*** to ***one or more temperatures*** of said

resonator." (*Emphasis added).* In contrast, the "simplest form" of logic put forth as an example by the Office Action does not include a logical handling of light frequencies, but only a comparison to determine if a measured temperature is equal to a set temperature. Therefore, as illustrated by the Office Action's own example, even if Huber disclosed the simplest form of logic in the Office Action example, Huber would not, and does not, necessarily include the claim limitations of claim 1, and therefore does not anticipate claim 1.

Since claims 2, 3, and 6 depend on claim 1, they include the feature of "logic associating one or more frequencies of light to one or more temperatures of said resonator," and are also not anticipated by Huber. Similarly, independent claim 7 recites a process involving identifying a frequency stored in a logic device, and identifying a temperature associated with that frequency in the logic device. Therefore, for at least the same reasons given above in relation to claim 1, Huber does not necessarily function in accordance with the limitations of claim 7, and therefore does not anticipate claim 7.

2. §102 Rejection of the Claims

Claims 1, 3-4 and 6-7 were rejected under 35 U.S.C. § 102(b) for anticipation by Ueda (U.S. 6,498,878). The Applicant respectfully traverses this rejection.

Ueda relates to a waveguide grating. The waveguide grating consists of an underlying clad 31, waveguides 14, and upper clad 33, deposited on a substrate 11. A heater 22 forms a zigzag pattern on upper clad 33. Col. 3, lines 39-49. The temperature of the waveguides is kept constant, thereby keeping the difference in lengths among the waveguides constant, which keeps the center wavelength of the output waveguides constant. Col. 4, lines 33-41.

The Office Action states that the waveguide grating 14 of Ueda is a resonator. The Applicant respectfully traverses this contention. The temperature control in Ueda is directed to maintaining the difference in length of the waveguides so that the output of the center waveguide remains constant. In the present application, the temperature of the

resonator directly affects the refractive index of the resonator, thereby determining the frequency selected by the circuit. Consequently, the waveguides of Ueda are not resonators, and do not anticipate claim 1 of the application. The Applicant further respectfully submits that claim 7, which recites a resonator, and claims 2-6, which depend on claim 1, are also distinguished over Ueda.

Furthermore, claims 1 and 7 recite that the photonic switch retrieves a temperature/frequency pair from a logic device, and sets the resonator at that temperature so as to precisely select the associated frequency. Ueda does not disclose such a precise frequency selection scheme. Specifically, Ueda does not disclose a processor or memory that is used to precisely select a frequency like that which is disclosed in the present invention. Also, Ueda discloses a process of maintaining the temperature of a waveguide constant, so as the center wavelength of output wave guides are kept constant. Ueda is not concerned with selecting temperature frequency pairs in order to select a precise frequency in a photonic circuit. Consequently, claims 1 and 7, and their associated dependent claims, are patentable over Ueda.

The Office Action further states in relation to Ueda that "in order for the system [of Ueda] to associate a measured temperature with a desired temperature (which would cause the arrayed grating to perform the multiplexing/demultiplexing according to a designed protocol), it is inherent that some kind of logic is used (e.g., in the simplest form whether a measured temperature is equal or not to a set temperature)." For at least the same reasons outlined above in connection with the Huber reference, Ueda does not necessarily function or contain all the claim limitations of claim 1 or claim 7, and therefore cannot anticipate claim 1 or claim 7, or claims 3, 4, or 6 that are dependent on claim 1.

3. §102 Rejection of the Claims

Claims 1, 3, 6-8 and 10-11 were rejected under 35 U.S.C. § 102(b) for anticipation by Eggleton (U.S. 6,438,277). The Applicant respectfully traverses this rejection.

Eggleton relates to a thermally tunable optical device 9 that has an optical waveguide 10, thermally sensitive optical element 11, electrical resistance heater 12, current source 13, and a control circuit 14. The control circuit 14 has a microprocessor controller 15 and a resistance detector 16. The resistor detector 16 is coupled to the heater 12, and the output of the detector 16 is supplied to the controller 15. (Col. 2, line 64 --- Col. 3, line 11). The signal from the detector 16 to the controller 15 is used to stabilize the device. (Col. 3, lines 37-38).

The present invention is not directed to stabilizing a device like Eggleton, but rather, is directed to precisely controlling a photonic switch by selecting temperature/frequency data from a logic device, and adjusting the temperature of the resonator to that temperature, thereby precisely controlling the frequency selected by the photonic circuit. Eggleton does not disclose such a precise temperature/frequency logic means to select a particular frequency. Moreover, the infinitely variable and precise control of the frequency selected by the present invention is not inherent in Eggleton. Indeed, Eggleton discloses only a conventional feedback loop to maintain the stability of the device (Col. 4, lines. 10-15), not extensive temperature/frequency logic to operate as an infinitely variable switch. Also, Eggleton discloses only a single control signal to the microprocessor 15 (to ***stabilize*** the circuit against ***ambient*** changes, Col. 2, line 35), not extensive temperature and frequency logic to infinitely and variably select a frequency as disclosed by the present invention.

The Office Action further states in connection with Eggleton that "in order for the system [of Eggleton] to associate a measured temperature with a desired temperature (which would cause the grating to transmit or reflect the desired wavelength), it is inherent that some kind of logic is used (e.g., in the simplest form whether a measured temperature is equal or not to a set temperature)." For at least the same reasons outlined

above in connection with the Huber reference, Eggleton does not necessarily function or contain all the claim limitations of claim 1 or claim 7, and therefore cannot anticipate claim 1 or claim 7. Since claims 3, 6, 8, 10 and 11 depend on claim 1 or claim 7, Eggleton does not anticipate those claims either.

4. and 5. §103 Rejections of the Claims

Claims 5 and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Huber (U.S. 5,159,601) in view of Koizumi (U.S. 5,696,543). Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Huber (U.S. 5,159,601) in view of Schwindt (U.S. 6,720,782). The Applicant respectfully traverses this rejection.

To find the present invention *prime facie* obvious, at the very least, all of the elements of the rejected claims 5, 9 and 12, must be disclosed in the references (Huber with Koizumi or Huber with Schwindt) upon which the rejection is based. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) **must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). MPEP 2142 (emphasis provided).

In connection with these obviousness rejections, the Office Action states that Huber discloses all the limitations of claims 5 and 9 except for specifying that the metal wire of the sensor is aluminum, and that Huber discloses all the limitations of claim 12 except for specifying that during the measurement of the resistance of the wire, the value of the voltage is taken by using a voltmeter connected to the wire via a Kelvin connection. The Applicant respectfully submits that as shown above, Huber does not disclose "logic associating one or more frequencies of light to one or more temperatures of said

resonator." Consequently, the Office Action has failed to establish a prima facie case of obviousness, and the Applicant respectfully requests the withdrawal of these rejections.

Office Action's Response to Applicant's Previous Arguments

The Final Office Action asserts that it would be impossible for the devices of either Huber or Ueda to operate without any type of processing means as well as a type of data storage to compare a measured value against a desired set of values. The Applicant respectfully disagrees with this contention.

Huber relates to adjusting a laser so that the selected wavelength remains in the laser's gain bandwidth by adjusting the dimensions of a grating with a heating element. Col. 1, lines 40-44; Abstract. This control is accomplished through the use of a hard-wired circuit including a thermistor 26 and a difference amplifier 28. Col. 2, lines 57-61. Therefore, contrary to the assertion of the Office Action, the device of Huber can and does operate without processing means and a type of data storage.

Similar, in Ueda, the temperature of the waveguides 14 is kept constant by means of a feedback circuit. Col. 4, lines 34-37. Ueda does not disclose such a circuit, but the Applicant respectfully submits that such a circuit could be hard-wired, without a processor or memory, such as in Huber.

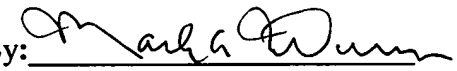
CONCLUSION

As shown above, neither Huber, Ueda nor Eggleton, taken singly, anticipate the claimed invention under 35 U.S.C. 102 (b) or (e). Nor does the combination of Huber with Koizumi or Huber with Schwindt teach or suggest the claimed invention under 35 U.S.C. 103(a).

Applicant respectfully requests reversal of the final rejection of claims 1 – 13 and passage of this application on to issue.

Respectfully Submitted,

Dated: November 28, 2005
(Monday)

By: 

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VIII. Claims Appendix

A copy of the claims involved in the appeal is provided below.

1. A photonic circuit comprising:

a resonator;

means for heating said resonator;

means for measuring a temperature of said resonator;

means for coupling said temperature measuring means to said heating means; and

logic associating one or more frequencies of light to one or more temperatures of said resonator;

wherein said temperature measuring means monitors said temperature of said resonator and transmits signals to said heating means based on said temperature and said logic; and further

wherein said heating means is enabled or disabled so that said resonator is maintained at a precise temperature and selectively filters a frequency of light corresponding to said temperature.

2. The photonic circuit according to claim 1, wherein said resonator, said heating means, said temperature measuring means, and said coupling means are etched onto an integrated circuit chip.

3. The photonic circuit according to claim 1, wherein said temperature of said resonator is varied over a range of temperatures, thereby causing said resonator to selectively add and drop frequencies corresponding to said temperatures, and wherein said photonic circuit further comprises means to process said selected frequencies.

4. The photonic circuit according to claim 1, wherein said circuit is used as an accurate control for photonic switching.

5. The photonic circuit according to claim 1, wherein said temperature measuring means comprise an aluminum wire.

6. The photonic circuit according to claim 1, wherein said coupling means comprise a processor.

7. A process to variably tune a frequency selected by a photonic resonator comprising the steps of:

identifying a frequency stored in a logic device to be selected by said photonic resonator;

identifying a temperature stored in said logic device, said temperature associated with said frequency stored in said logic device;

sensing a temperature of said photonic resonator;

transmitting a measure of said temperature to a processor;

determining whether said temperature of said photonic resonator equals said temperature identified in said logic device; and

adjusting said temperature of said photonic resonator to equal said temperature identified in said logic device.

8. The process to variably tune a frequency selected by a photonic resonator according to claim 7, wherein said temperature is sensed by a change in resistance of a metal wire.

9. The process to variably tune a frequency selected by a photonic resonator according to claim 8, wherein said metal wire comprises aluminum.

10. The process to variably tune a frequency selected by a photonic resonator according to claim 9, further comprising the steps of:

measuring a resistance of said wire at room temperature;

increasing resonator temperature by forcing a current though the said wire;

determining the temperature of said photonic resonator during operation by measuring the resistance of the wire at this temperature.

11. The process to variably tune a frequency selected by a photonic resonator according to claim 8, further comprising the steps of:

transmitting a current through said wire;

connecting a volt meter to said wire;

measuring a voltage across said wire; and

calculating the resistance of said wire.

12. The process to variably tune a frequency selected by a photonic circuit according to claim 11, wherein said volt meter is connected to said wire via a Kelvin connection.

13. The process to variably tune a frequency selected by a photonic resonator according to claim 7, wherein said measure of temperature is used as a key into a lookup table, said lookup table comprising different frequencies selected by said resonator at different temperatures.

IX. Evidence Appendix

No evidence other than the application as filed including the Figure is relied upon.

X. Related Proceeding Appendix

Pursuant to 35 U.S.C. 41.37(c)(x), copies of decisions rendered by a court or the Board in any proceedings identified above under 35 U.S.C. 41.37(c)(1)(ii) are enclosed herewith. As appellants are aware of no decisions or proceedings having a bearing on the present appeal, nothing is included in this section of the Appendix.